

REMARKS

Claims 63, 64, 66, 67, 69, 72, 73, 75, 76, 78-80, 87, 88, 91, 97, 98 and 100-108 are pending in the application. The Examiner has rejected Claims 63, 64, 66, 67, 69, 72, 73, 75, 76, 78-80, 87, 88, 91, 97, 98 and 100-108 under 35 U.S.C. §103(a) as being unpatentable over Applicants' Admitted prior art (Admitted prior art) in view of Webster (U.S. Patent 5,307,351). The Examiner has rejected Claims 64, 73, 102 and 105 under 35 U.S.C. §103(a) as being unpatentable over Applicants' Admitted prior art in view of Webster, and further in view of MacNamee et al. (U.S. Patent 5,212,684). In addition, the Examiner has objected to Claim 91 and Claim 64.

Regarding the objection to Claim 91, the Examiner stated that the period in line 5 should be a semicolon. Appropriate correction to Claim 91 has been made. Withdrawal of the objection is respectfully requested.

Regarding the objection of Claim 64, the Examiner stated that it is not clear what is meant by concatenating the output of the turbo encoder. It is respectfully submitted that as each segment is processed by the turbo encoder, the output segments are then concatenated prior to interleaving. The Examiner is directed to the detailed description at page 18, line 17 to page 19 line 7 of the present application. Claim 64 has been amended to clarify this process. Based on the foregoing, withdrawal of the objection is respectfully requested.

In addition, independent Claims 63, 72, 79, 87, 91 and 97 have been amended.

Claim 63 has been amended to more clearly recite that the processor determines the number and size of sub frames that can be generated from the input data frame of variable size, and separately turbo encoding each of the sub frames. Each of these elements are not disclosed or suggested by the cited references.

Claim 72 has been amended to more clearly recite that the method determines the number and size of sub frames that can be generated from the input data frame of variable size, and separately turbo encoding each of the sub frames. Each of these elements are not disclosed or suggested by the cited references.

Claim 79 has been amended to more clearly recite separately turbo encoding each of the sub frames, an element not disclosed or suggested by the cited references.

Claim 91 has been amended to more clearly recite separately turbo decoding each of the sub frames, and combining the decoded sub frames into the original input data frame. Each of these elements are not disclosed or suggested by the cited references.

Claim 64 has been amended to recite that the encoded data frame is constructed by concatenating the encoded sub frames, an element not disclosed or suggested by the cited references. Please note that block 16 shown in FIG. 1 of the present applicaiton indicated by the Examiner is a prior art turbo encoder internal interleaver, whereas the interleaver recited in Claim 64 is a channel interleaver.

Claim 87 has been amended to more clearly recite that the sub frame is decoded to output a decoded sub frame, and that the decoded sub frame is combined. Each of these elements are not disclosed or suggested by the cited references.

Claim 97 has been amended to more clearly recite that the encoded data frame is constructed by concatenating the encoded sub frames, an element not disclosed or suggested by the cited references.

Prior to addressing the rejections contained in the Office Action, the Examiner is respectfully presented with the following information to further an understanding of the present invention and at least some of its distinctions from the cited references. As discussed at page 3, line 8-16 of the present application, in the general mobile communication system various types of data are transmitted and received, each type having a different QoS (Quality of Service) depending on the characteristics of the data (i.e. voice data or packet data). Such variable QoSs translate into variable data frame lengths. Data rate can vary from several kbps to several Mbps depending on the type of service, such as voice or data (packet data), and frame length according to the data rate can also vary from several ms to several hundreds of ms. As stated above, the variable frame size disclosed by Webster, is not the "input data frame of variable size" of the present application; and in the present application, the "input data frame of variable size" is distinguished from the sub frame/super frame. Also, as the Examiner is well aware, turbo coding is a new channel coding scheme applied to the 3rd Generation (WCDMA and CDMA2000) mobile communication systems.

In the turbo coding scheme disclosed in the present application, the greater the size of the code block (i.e. input data frame size), the greater the efficiency of the turbo coding. The size of the code block and efficiency of the turbo encoder have a linear relationship. As the size of the code block increases, the linear increase of the efficiency reaches maximum efficiency at a determinable block size. Accordingly, if a block size is greater than said determinable block size, for example, the prior art system experiences performance degradation due to an increase in receiver memory size and complexity. Also, in the case of code block sizes that are less than a

predetermined block size, the smaller block size may cause efficiency deterioration compared with a block code or convolutional code scheme. Accordingly, in a system utilizing a turbo code, by considering such factors as the characteristics cited above, that is the input data frame size (number of input data bits) input to a turbo encoder, and readjusting the frame size based on the need for maximum efficiency, efficiency of the coding can be maximized when channel coding is performed.

The present application discloses a system and method to determine how to segment an original input data frame in order to maximize efficiency. Accordingly, the present application is distinguishable over the Webster reference, which merely discloses generating variable size input data.

The Examiner states that the Applicants' admitted prior art, at least in part, discloses the present invention. Figs. 1 and 2 of the admitted prior art illustrate basic elements of a prior art turbo encoder and decoder. The turbo encoder of the Fig. 1 does not include a specific procedure or apparatus for segmenting input data frames. Claim 63 recites a processor for determining a number and a size of sub frames which can be generated from the input data frame of variable size, according to a size of the input data frame. The processor as claimed in Claim 63 is not present in the admitted prior art, as the admitted prior art turbo encoder does not determine the number and size of sub frames from input data frames. The Examiner cites Webster as disclosing, "data assembly *based on channel characteristics...bit error rates...transmission line quality...*" However, Webster does not adjust the size of the data blocks input into a turbo encoder for the purpose of maximizing turbo encoding efficiency as recited in Claim 63. In Webster, when the amount of retransmissions requested is high, a frame is adjusted to a smaller size as it is determined that channel conditions are not good, but if the amount of retransmissions requested is few, a frame is adjusted to a large size so as to compensate for channel conditions. On the contrary, the present invention analyzes characteristics of the turbo encoder and adjusts input data frame sizes according to characteristics of the turbo encoder in order to optimize efficiency of the turbo encoding. That is, the "variable frame size" as used in Webster is the "input data frame of variable size" in the preamble of Claim 63. Based on at least the foregoing arguments and amendments, withdrawal of the rejection of Claim 63 is respectfully requested.

Withdrawal of the rejections of Claims 72, 79, 87, 91 and 97 is also respectfully requested based on at least the arguments presented above regarding Claim 63.

Regarding claims 63, 66, 67, 69, 72, 75, 76, 78-80, 87, 88, 91, 98, 100-104 and 106-108,

block 16 of Fig. 1 in the admitted prior art, relates to a turbo encoder internal interleaver, but Claims 63, 66, 67, 69, 72, 75, 76, 78-80, 87, 88, 91, 98, 100-104 and 106-108 of the present application disclose a channel interleaver. The feature of adjusting the input data frame size of a channel code is disclosed by the present application for the first time. Webster does not describe features related to channel coding and channel interleaving. The present application generates the sub frames by concatenating the input data frame having a variable frame length according to a predetermined condition, i.e. input data frame length, and performs channel encoding (turbo encoding) for each sub frame. However, the reference, Webster, and conventional mobile communication system do not perform such an operation. Based on at least the foregoing arguments, withdrawal of the rejections of Claims 63, 66, 67, 69, 72, 75, 76, 78-80, 87, 88, 91, 98, 100-104 and 106-108 is respectfully requested.

Regarding the rejection of Claims 64, 73, 102 and 105 under §103(a) as being unpatentable over the admitted prior art, Webster and MacNamee et al., Figs. 1-2, page 1 last paragraph to page 4 paragraph 2 of the present application indicated by the Examiner, fails to disclose the subject matter of the present application, i.e. channel interleaving and multiplexing. Regarding the rejection as based on the multiplexing step, as seen from col. 5 lines 15 to 22, block 22 of Fig. 5 in the cited reference, MacNamee et al. indicates means for selecting one among three predetermined time slots to transmit information, as seen from col. 5, lines 41 to 44, block 34 of Fig. 5, which indicates means for selecting a time slot on which the information is transmitted. On the contrary, the multiplexer of Claims 64, 73, 102 and 105 in the present application, is connected to a turbo encoder and is a means for efficiently multiplexing outputs, since there is a plurality of outputs for one input data bit in the characteristics of a turbo encoder. The multiplexer of the present application is the same in name only with the multiplexer of blocks 22 and 34 of Fig. 5 of MacNamee et al. indicated by the Examiner, but is totally different from those in the MacNamee et al. reference. Col. 2, lines 10 to 16 of MacNamee et al. relates to a frame structure for supporting a DECT/TDMA system and does not disclose a multiplexer as in the claims of the present application. Furthermore, the Examiner alleges that the multiplexing means includes a controlling function for memory size or permissible delay, which are conditions for determining its number of sub frames; the multiplexer recited in the claims of the present application does not relate to such a function. Finally, there is not even mentioned the feature of memory size or permissible delay in col. 2, lines 10 to 16 of MacNamee et al. Based on at least the foregoing arguments, withdrawal of the rejections of Claims 64, 73, 102 and 105

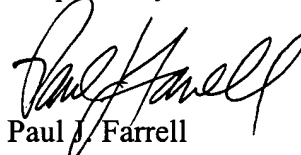
is respectfully requested.

Based on at least the foregoing, withdrawal of the rejections of the claims is respectfully requested.

Independent Claims 63, 72, 79, 87, 91 and 97 are believed to be in condition for allowance. Without conceding the patentability per se of dependent Claims 64, 66, 67, 69, 73, 75, 76, 78, 80, 88, 98 and 100-108, these are likewise believed to be allowable by virtue of their dependence on their respective amended independent claims.

Accordingly, all of the claims pending in the Application, namely, Claims 63, 64, 66, 67, 69, 72, 73, 75, 76, 78-80, 87, 88, 91, 97, 98 and 100-108, are believed to be in condition for allowance. Should the Examiner believe that a telephone conference or personal interview would facilitate resolution of any remaining matters, the Examiner may contact Applicants' attorney at the number given below.

Respectfully submitted,



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